

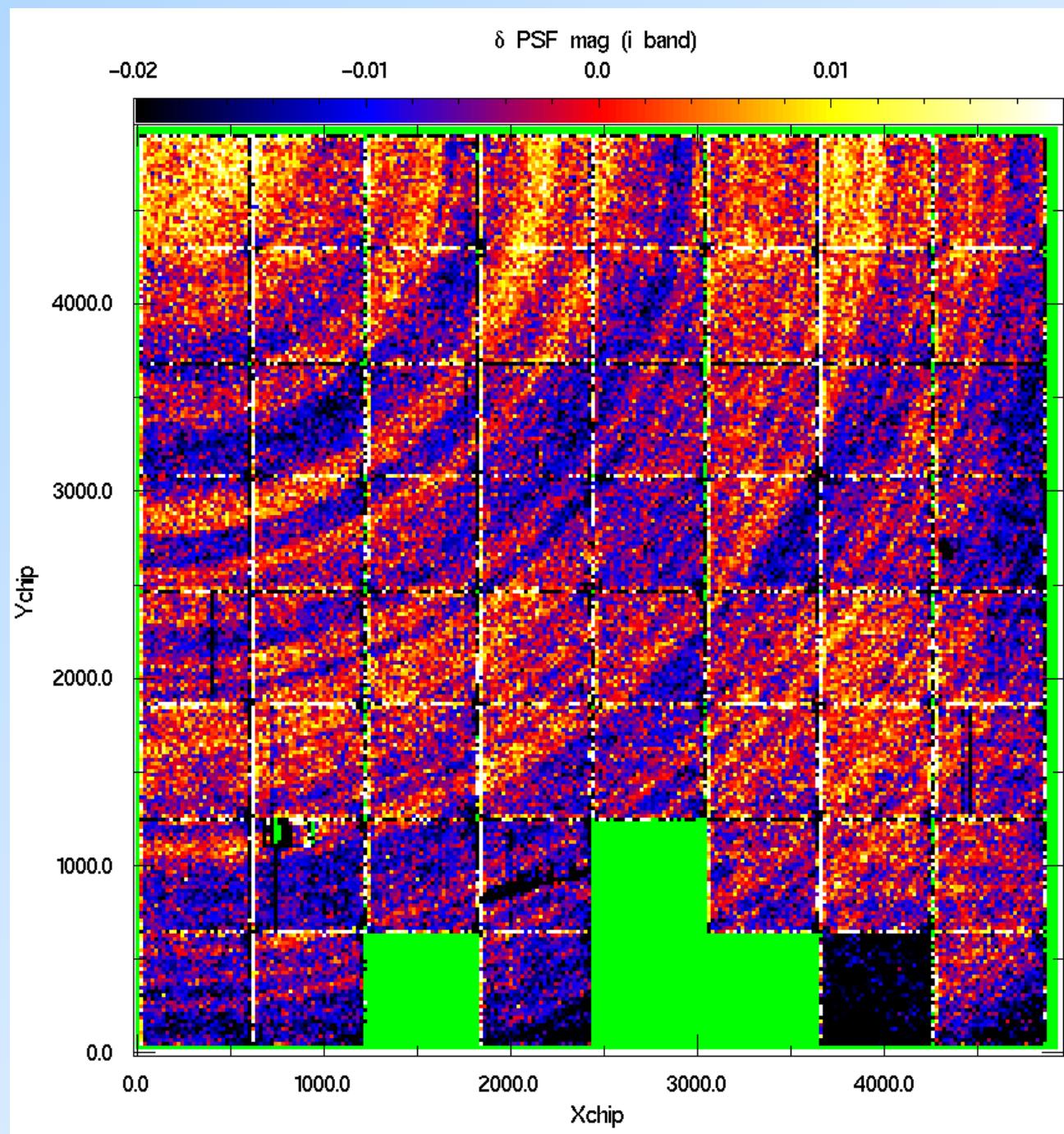
Precision Astrometry and Photometry from Pan-STARRS 1



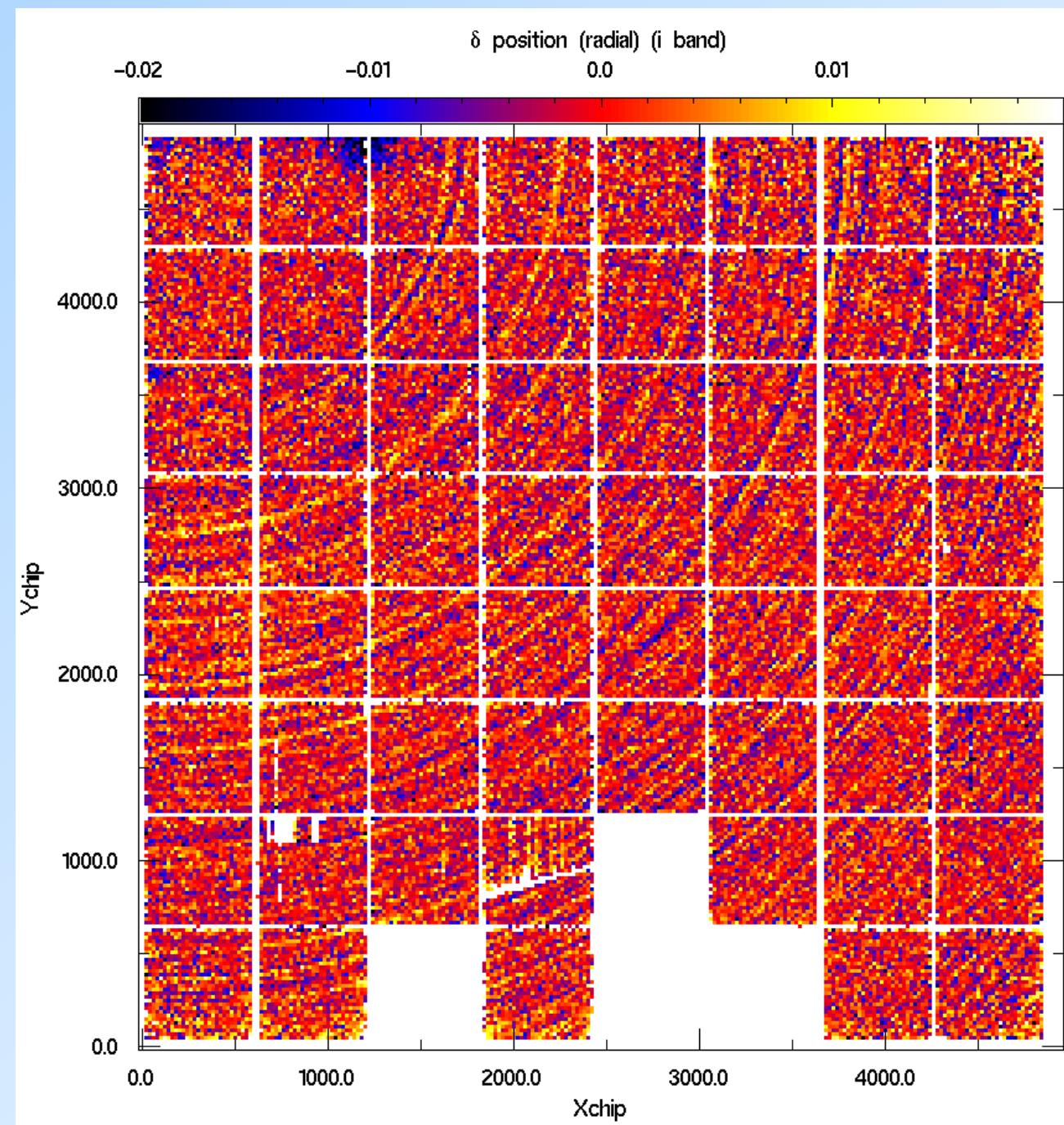
Eugene Magnier

thanks to
John Tonry
Doug Finkbeiner

PSF magnitude residuals (i-band, chip XY40)

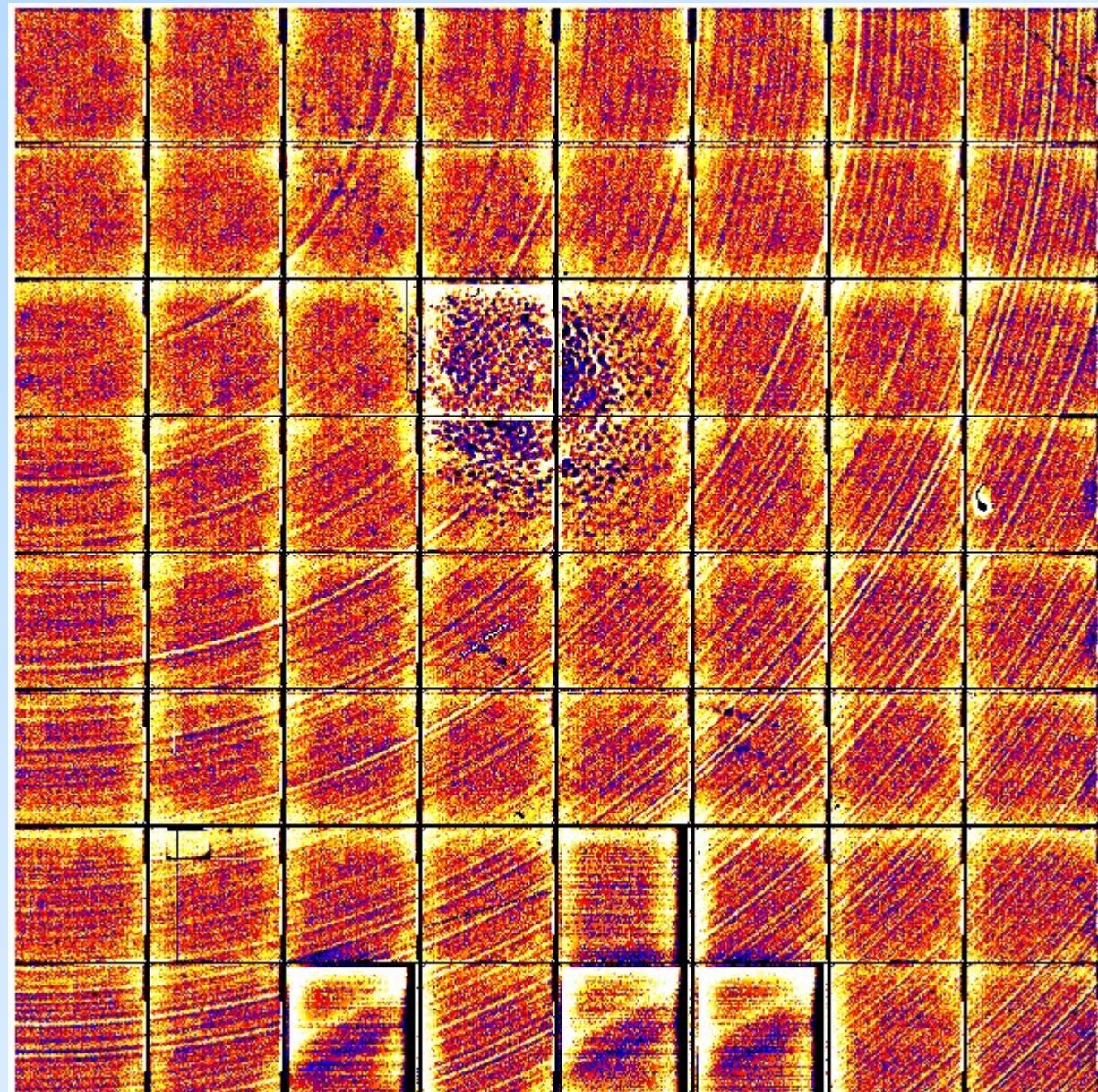


Astrometric Residuals (radial, i-band, XY40)



Flat Field (after high-pass filtering)

monochromatic flat @ 630nm



Aperture magnitude residuals (i-band, XY40)

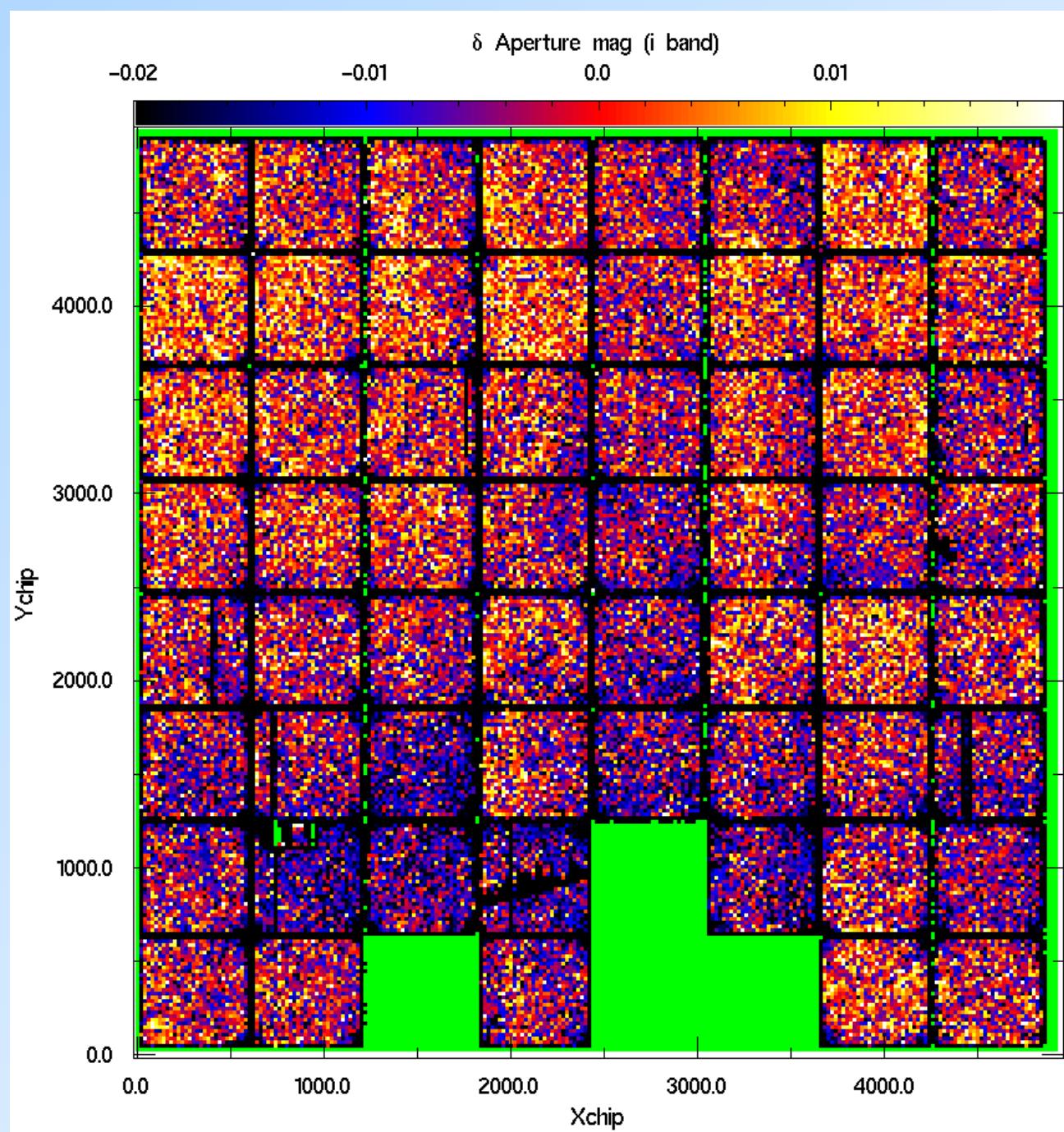
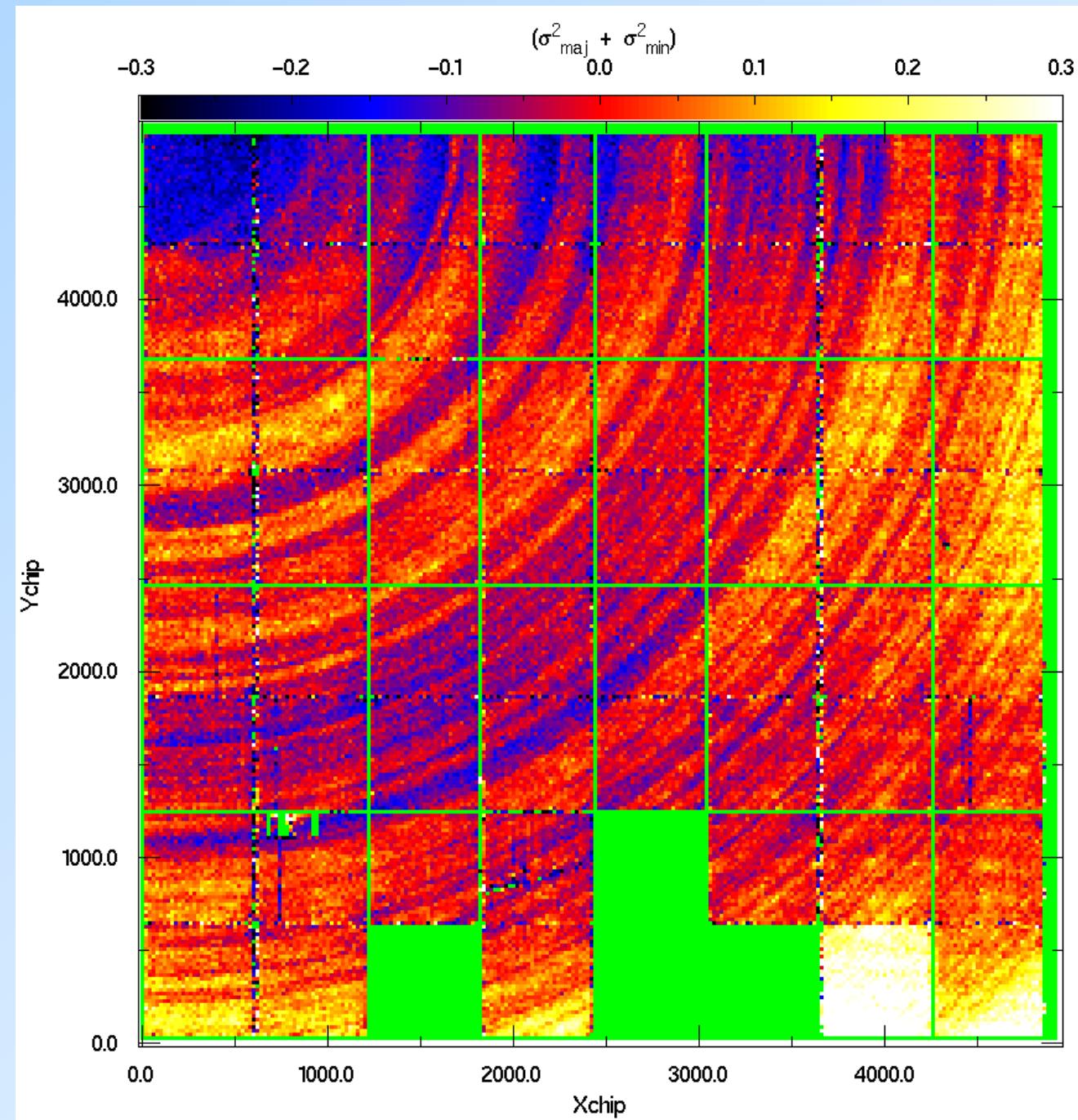


Image Smearing ($\sigma_{\text{major}}^2 + \sigma_{\text{minor}}^2$: i-band, XY40)



PSF magnitude residuals (i-band, chip XY40)

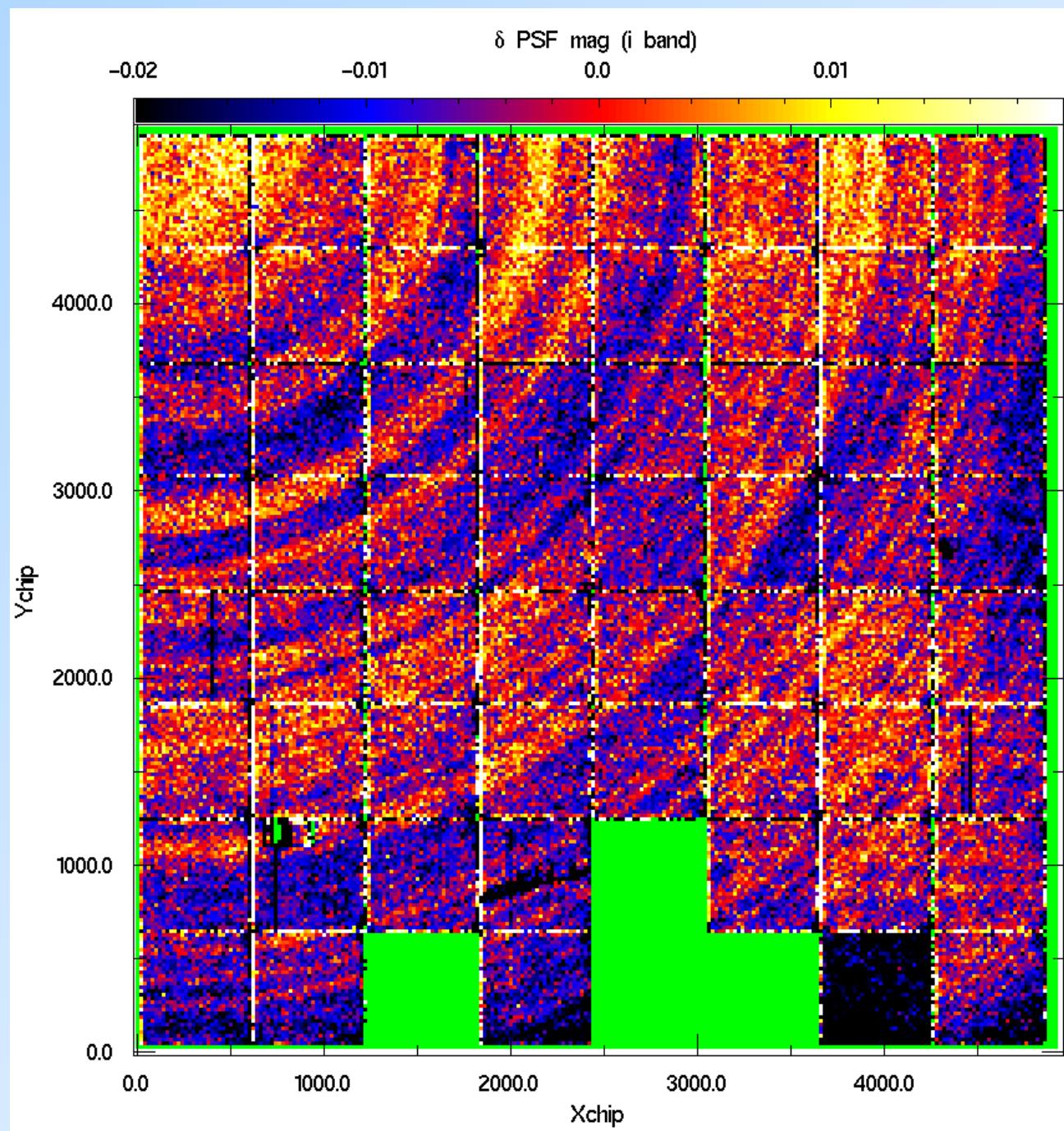


Image Shearing ($\sigma^2_{\text{major}} - \sigma^2_{\text{minor}}$: i-band, XY40)

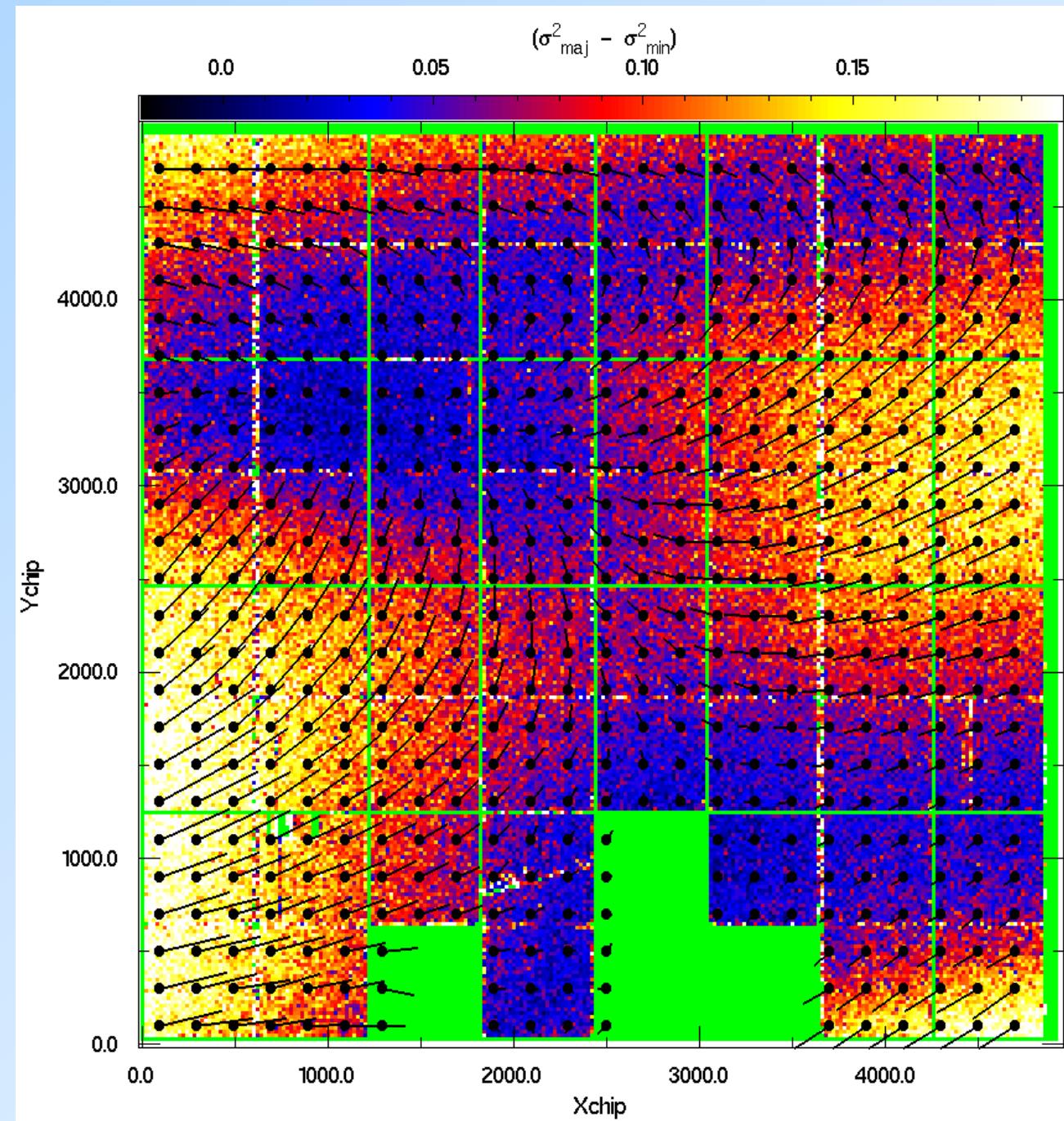


Image Smearing vs filter

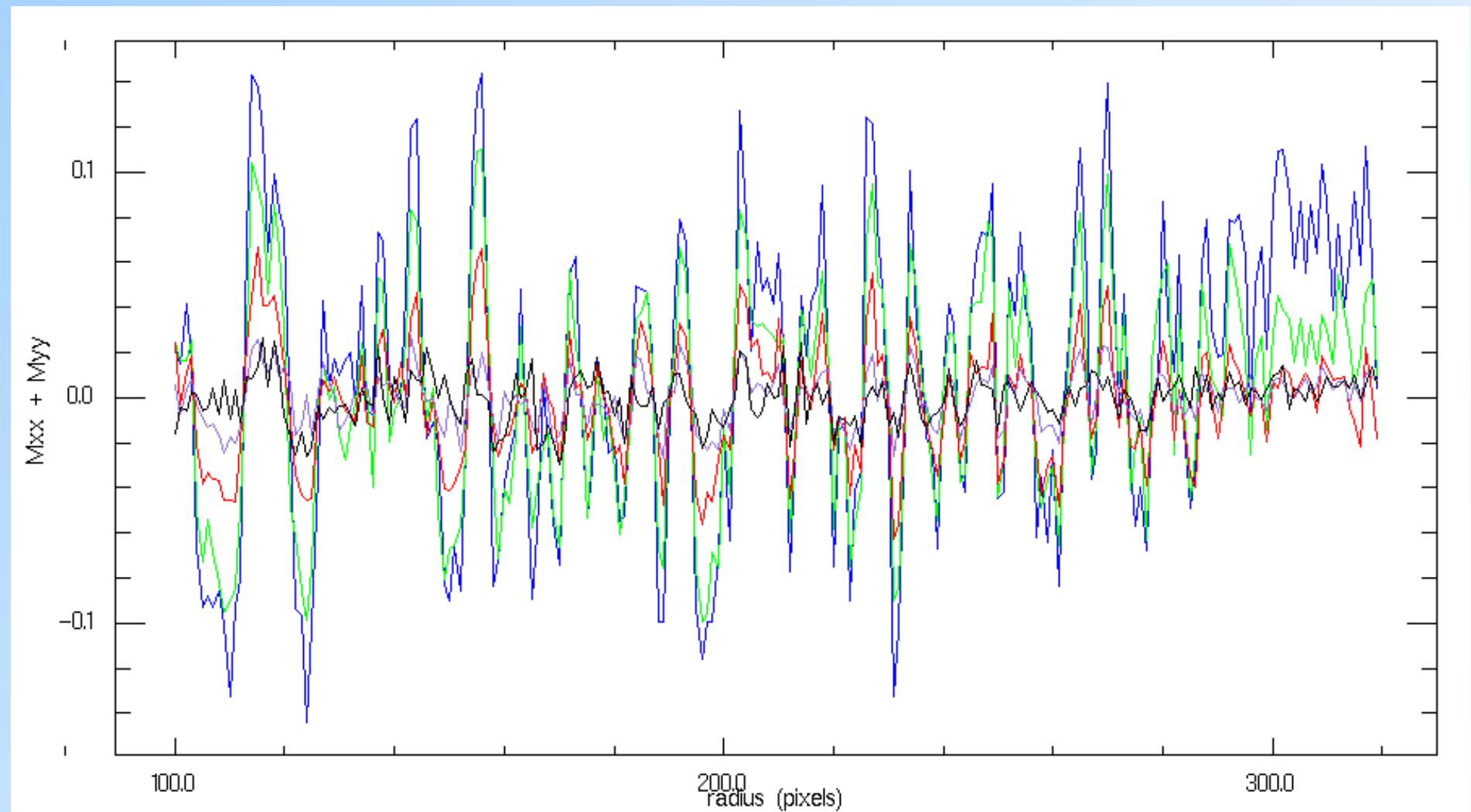
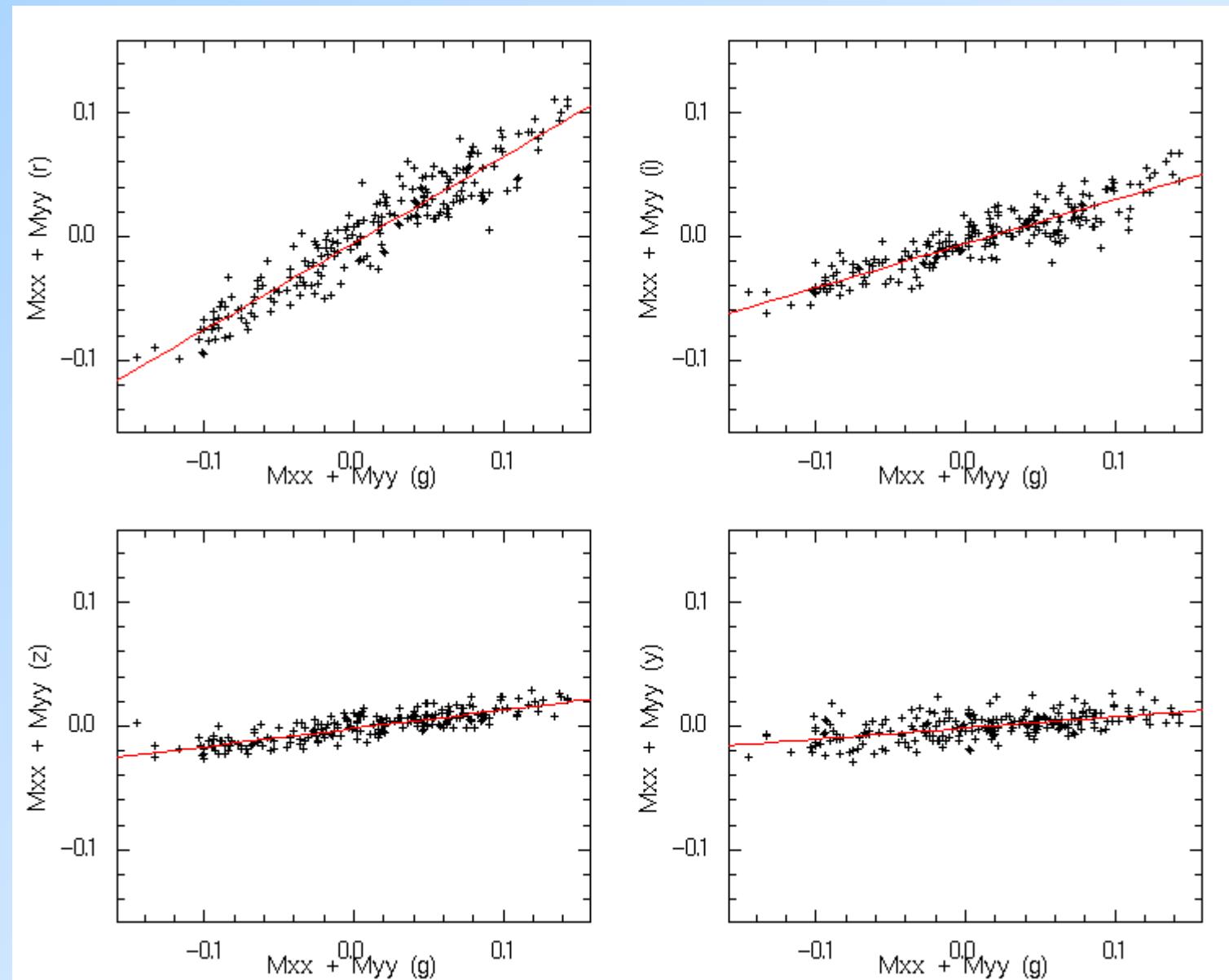


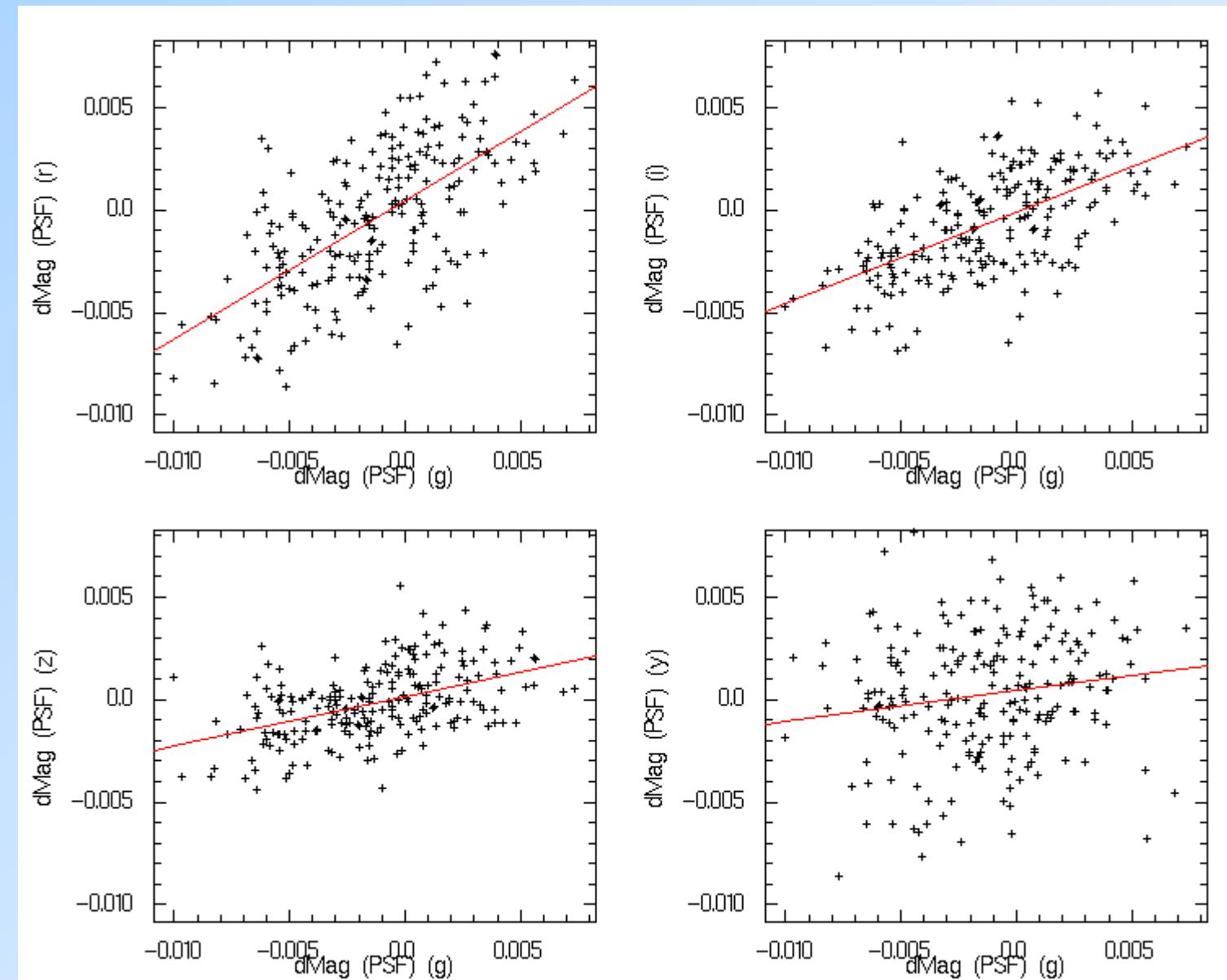
Image Smearing : correlations between filters

- $r / g = 0.70$
- $i / g = 0.35$
- $z / g = 0.15$
- $y / g = 0.09$



PSF magnitude residuals : correlations between filters

- $r / g = 0.68$
- $i / g = 0.45$
- $z / g = 0.24$
- $y / g = 0.15$

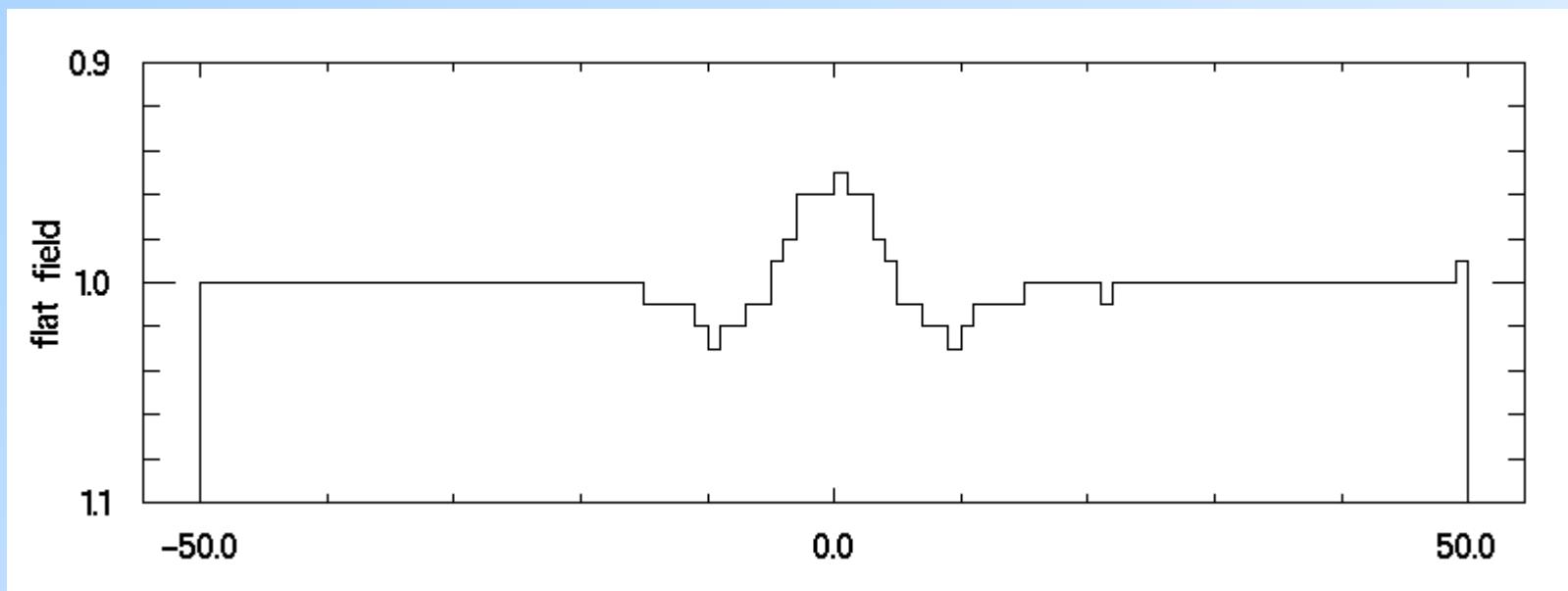


DES Tree Rings != PS1 Tree Rings

- DES:
 - flat field = apmag err
 - psf err = apmag err / 2
 - flat field = grad (astrom)
 - psf shear = psf err
- PS1:
 - flat field = astrom err
 - astrom err = grad (psf err)
 - psf shear small, uncorrellated
 - psf smear = psf err

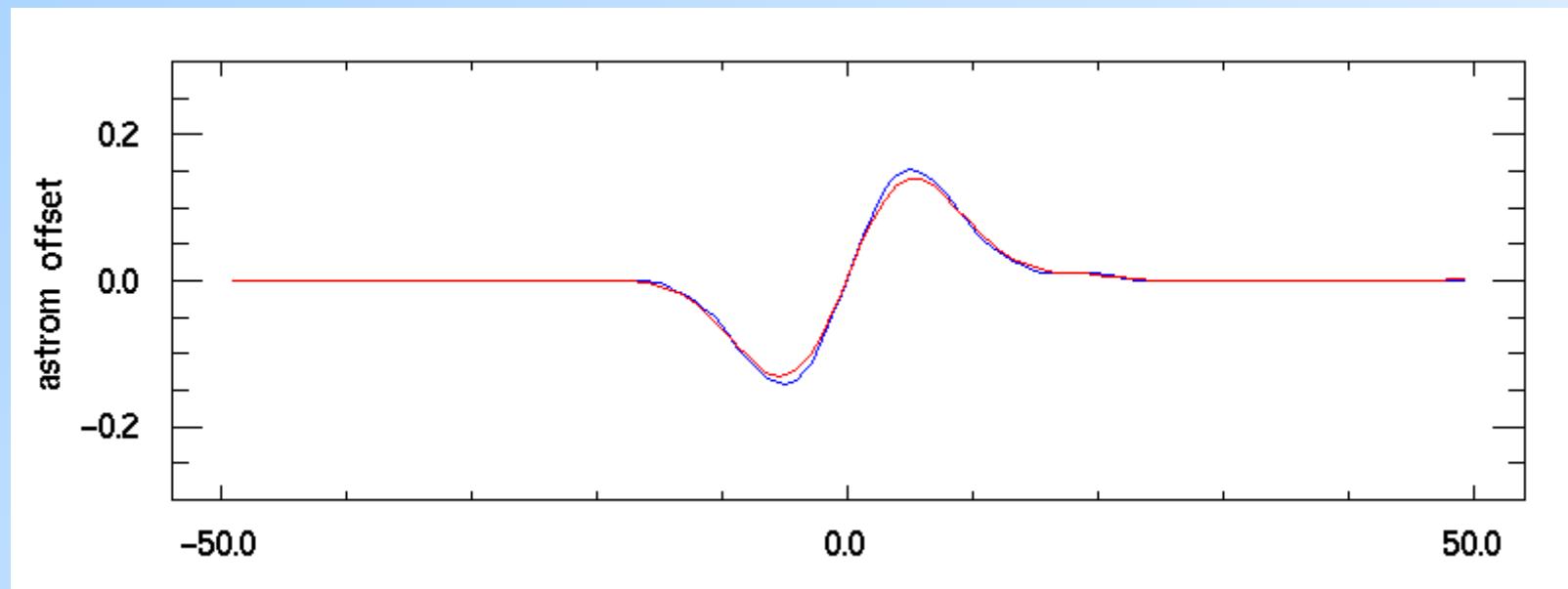
DES Tree Rings : a simulation

- flat-field error (inverse)



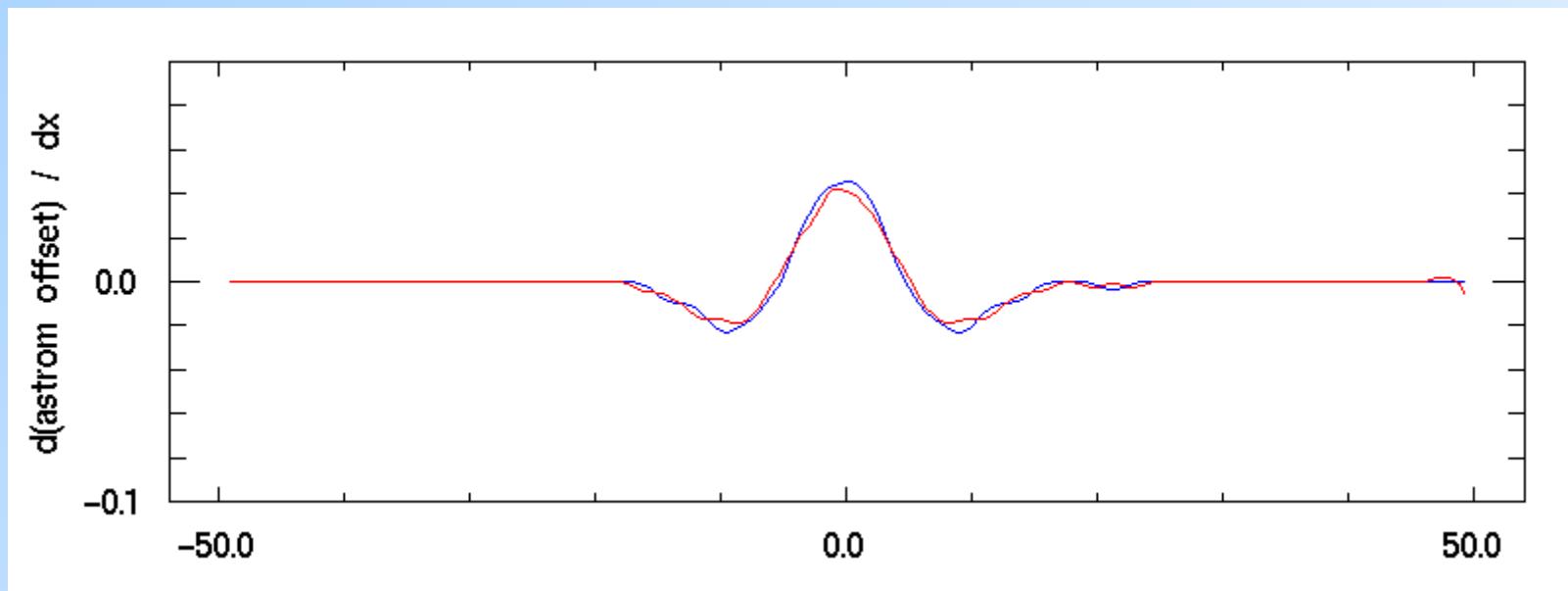
DES Tree Rings : a simulation

- astrometry offset



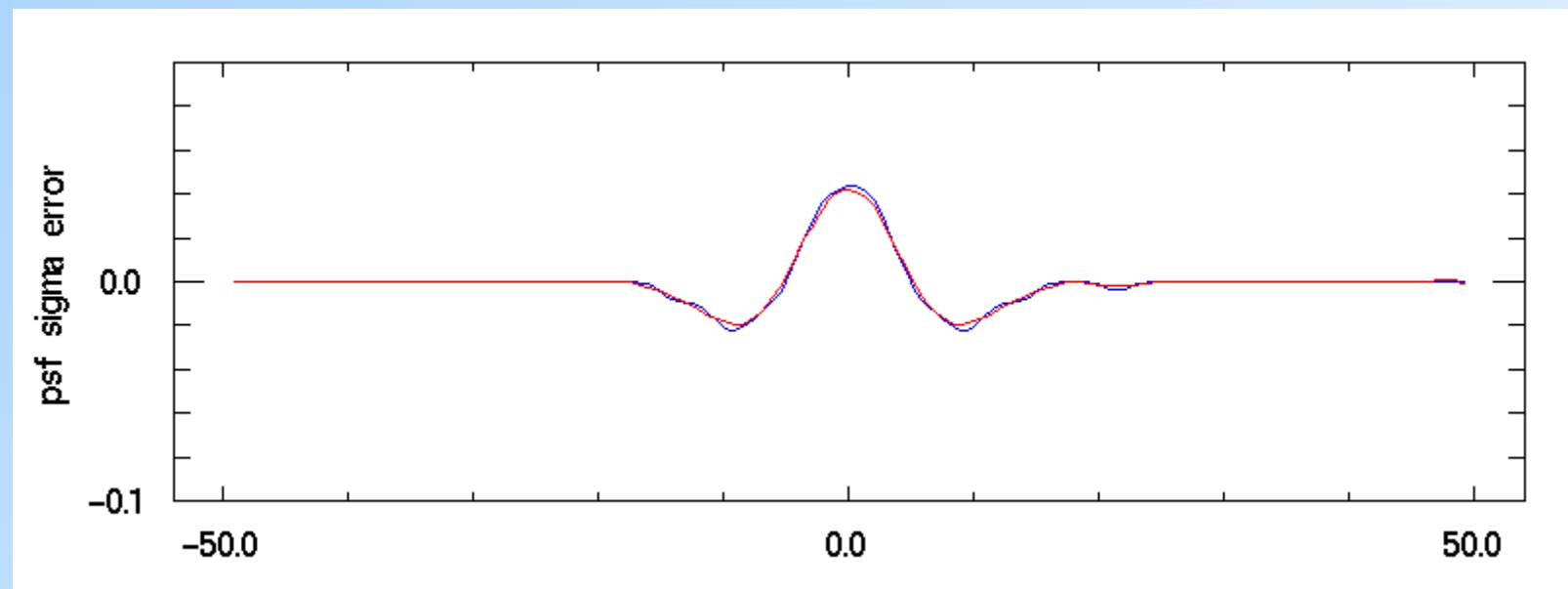
DES Tree Rings : a simulation

- astrometry gradient = $1 - 1 / \text{flat-field error}$



DES Tree Rings : a simulation

- psf sigma variation : \sim astrometry error
 - spatial scale of variation << spatial scale of PSF model
 - causes an error in PSF photometry



DES Tree Rings : a simulation

- psf photometry offset

